# Tracking Collars

**With wildlife, half the battle with doing research is finding them in the first place! Tracking collars have been used for decades, but they continually get better with technological advancements.**



## How does it work?

Researchers fit lions with a sturdy collar. This collar is much the same as a collar you would put on a pet dog or pet cat, but much tougher and very light, just 1% of the animals body weight. These collars last about 2 years before they need to be replaced.

The collar is fitted with two devices:

- **A GPS (Global Positioning System) device** - this device records a location by searching for satellites. When it finds at least 3, it uses these to **triangulate** the location. Once a day this device uploads an information package containing all recorded locations to a satellite and back to the researchers. These cost about $3,000 - $6,000 USD.
- **A VHF (Very High Frequency) device** - this device sends an **inaudible** radio signal out. Researchers drive around, holding up an antenna and listening for the radio signal. When they find it they can pinpoint the lion's location. These cost about $300 USD.

## Who gets a collar?

Lions are the only true social cat, which means if you know where one is, you know where the whole group is! Usually, just one prime-age female in a **pride** will be fitted with a collar. In a **coalition**, one of the males will be fitted. When the collar wears out the same animal will be collared again.



To fit a collar, researchers will select an animal, and a veterinarian will use a **tranquilizer** to **sedate** the animal from a distance. The researchers have between 45min and 1 hour to collect data and fit the collar. They will use this time to take body measurements, hair samples, tissue samples and blood draws, as well as fit the collar and make sure it is working correctly.

Sedating a lion can be difficult and dangerous both to the humans and the lions, so the people do everything they can to collect data and help the animal in this time.

## What data does a tracking collar give us?

The collar records a GPS point at a schedule set by the researchers. While it could be set to record a point every ten minutes, this would drain the battery very quickly. This level of detail isn't really necessary for lion tracking either! Researchers in the Zambian Carnivore Programme set the collars to record every 4 hours. This gives them a good idea of how far the lions are moving and what they are doing.

The data the device uploads is two numbers for each point, a latitude and a longitude. These can be entered into a map like Google Maps to find out where the lion has been. These points can be connected together to create a 'track' showing how the lion has moved around and used the landscape.

## What are the benefits of tracking collars?

- They let us know how much room a lion needs to be able to hunt effectively. This changes will different **biomes**, and tells us how many lions can fit in an area comfortably.
- They can provide warnings when a lion is moving nearly humans to prevent wildlife-human conflict.
- When the collar stops moving it sends a 'mortality' signal letting researchers know the lion is not alive so they can accurately measure life span and identify the cause of death.
- Older versions of GPS collars needed to be retrieved to download the data. This meant the researchers had to wait until they could capture the animal again to get the data. New technology lets the collars upload this data everyday.

## What are some of the risks of tracking collars?

- They are expensive! The more expensive they are, the more accurate they are. Cheap devices are only accurate to a few hundred meters, but expensive devices can be accurate to centimetres. When devices are lost or damaged they are expensive to replace.
- They can be an entrapment hazard. Lion collars have to be tough to withstand lion teeth, and tight enough that they can't slip off and get lost. This means there is the possibility of a lion getting the collar caught and getting stuck, although researchers take many precautions to prevent this.
- Sometimes they can provide inaccurate data. If the lion is hiding under something like a rock overhang or a metal roof the signal can bounce before being picked up by the satellite and it looks like the lion is in a different spot. Usually researches can pick up these anomalies.

## Vocabulary

**biome -** a specific environment type, such as a grassland or jungle

**coalition** - a group of 2 - 4 male lions

**inaudible** - this means it can't be heard without s special device such as a VHF antenna

**pride** - a group of up to 30 lions, with a core group of related females and 2-4 males

**sedate** - to make unconscious or put to sleep for a short time

**tranquillizer** - a medicine that can be given to an animal via a dart fired from a gun.

## Practicalities

What are the costs involved in this method? (materials, resources, etc.)

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What are the personnel requirements? Break your answer down into the different steps in this method and what level of expertise and how much time is required for each step.

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## Implications

What questions is this method of data collection trying to answer?

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What might the flow on impact be for conservation of lions?

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# Tracking ELi-815F

This data was recorded from a lioness (ELi-815F) with the Chipela pride in South Luangwa National Park. She was collared on the 15 August 2023, with an [Telonics GPS Collar](). The E stands for Eastern (in this case in meaning Luangwa National Park), the Li stands for Lion, the number refers to the individual animal, and the F stands for female, so this is the Eastern Lion #815 (female).

The data in the following table shows 10 days of GPS points from October 2024. The left column shows the date and time (in 24 hour time) that the location was recorded. The middle and right columns show the GPS coordinates of that location.

## Questions

Does every day have the same number of data points? Why do you think this is?

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Why do you think the data is collected every four hours, except at 6:30am when an extra point is collected?

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What could we do with this data to make it more useful?

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What does this data tell you about the lioness that the data was collected from?

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What displays could we make from this data to help us understand it better?

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Is this sample size large enough to draw comprehensive conclusions from?

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Write a conservation message aimed at students from your school based on this data.

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# Tracking Eli 815

| Acquisition Time | GPS Latitude | GPS Longitude |
|---|---|---|
| **2024.10.01** 02:00:30 | -13.0632 | 31.69948 |
| 06:00:19 | -13.0645 | 31.70051 |
| 06:30:19 | -13.0645 | 31.70052 |
| 10:00:08 | -13.0625 | 31.70178 |
| 14:00:15 | -13.0626 | 31.70184 |
| **2024.10.02** 02:00:08 | -13.0586 | 31.71758 |
| 06:00:07 | -13.0472 | 31.73934 |
| 06:30:07 | -13.0453 | 31.74249 |
| 14:00:07 | -13.0403 | 31.75652 |
| 18:00:09 | -13.023 | 31.7729 |
| 22:00:08 | -12.9981 | 31.75977 |
| **2024.10.03** 02:00:09 | -12.983 | 31.77251 |
| 06:30:06 | -12.9836 | 31.77273 |
| 14:00:08 | -12.9831 | 31.77241 |
| 18:00:08 | -12.978 | 31.79158 |
| 22:00:06 | -12.9792 | 31.7978 |
| **2024.10.04** 02:00:10 | -12.9901 | 31.82647 |
| 06:00:05 | -12.9794 | 31.84593 |
| 06:30:08 | -12.9814 | 31.85107 |
| 14:00:05 | -12.9821 | 31.86312 |
| 22:00:08 | -12.9829 | 31.88942 |
| **2024.10.05** 02:00:07 | -12.9641 | 31.88646 |
| 06:00:13 | -12.9543 | 31.88049 |
| 06:30:06 | -12.9542 | 31.88049 |
| 10:00:07 | -12.9542 | 31.88053 |
| 14:00:07 | -12.9527 | 31.88698 |
| 18:00:06 | -12.9511 | 31.89675 |
| 22:00:24 | -12.9367 | 31.89156 |

| Acquisition Time | GPS Latitude | GPS Longitude |
|---|---|---|
| **2024.10.06** 02:00:08 | -12.9313 | 31.87625 |
| 06:00:08 | -12.9377 | 31.86946 |
| 06:30:06 | -12.9374 | 31.86866 |
| 14:00:05 | -12.9374 | 31.86873 |
| 18:00:10 | -12.9456 | 31.87366 |
| 22:00:07 | -12.9455 | 31.8736 |
| **2024.10.07** 02:00:30 | -12.9454 | 31.87354 |
| 06:00:07 | -12.9451 | 31.87345 |
| 06:30:10 | -12.9451 | 31.8735 |
| 10:00:19 | -12.9452 | 31.87335 |
| 14:00:14 | -12.9453 | 31.87335 |
| 18:00:09 | -12.951 | 31.90545 |
| 22:00:08 | -12.9507 | 31.90531 |
| **2024.10.08** 02:00:06 | -12.9452 | 31.87319 |
| 06:00:06 | -12.9617 | 31.86033 |
| 06:30:06 | -12.9617 | 31.86038 |
| 10:00:10 | -12.9612 | 31.86131 |
| 18:00:24 | -12.9612 | 31.86113 |
| 22:00:07 | -12.9668 | 31.85586 |
| **2024.10.09** 02:00:05 | -12.967 | 31.85455 |
| 06:00:05 | -12.9741 | 31.85598 |
| 06:30:05 | -12.9741 | 31.85594 |
| 10:00:07 | -12.9742 | 31.85594 |
| 14:00:05 | -12.9742 | 31.85558 |
| 18:00:06 | -12.9745 | 31.85567 |
| 22:00:06 | -12.9618 | 31.85953 |
| **2024.10.10** 02:00:16 | -12.9623 | 31.85886 |
| 06:00:05 | -12.9617 | 31.86044 |
| 06:30:05 | -12.9617 | 31.86041 |
| 14:00:04 | -12.961 | 31.85909 |
| 18:00:08 | -12.9748 | 31.85809 |

## Data Display

Looking at the data provided, and your answers in the 'Implications' section, what type of display will you create to interpret the data and communicating your findings?

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Create your display in the box below: